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The University Matriculation Board
Ontario

JUNIOR MATRICULATION

Pass, Honour, and Scholarship.

Regulations and Courses of Study

TORONTO:
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UNIVERSITY JUNIOR MATRICULATION

Creation and Powers of the University Matriculation Board

1.—(1) As a result of a conference of representatives of the University of Toronto; Queen's University, Kingston; McMaster University, Toronto; and the Western University, London, held at the University of Toronto in December, 1908, the Senates of these Universities created "The University Matriculation Board" to conduct and control their annual Matriculation examinations; said Board to be composed of eight members—four appointed by the Senate of the University of Toronto, two by the Senate of Queen's University, and one each by the Senates of McMaster and the Western Universities. The Board was organized on January 27th, 1909. In accordance with the University Statutes creating the University Matriculation Board—(1) This Board appoints the examiners for the Junior Matriculation examinations, regulates the conduct of the examinations, considers the reports in connection therewith, and determines the results; and (2) Under this Board the standards and the subjects of the examination papers for Pass and Honour Matriculation are determined by the Statutes and Regulations of the University of Toronto as adopted pursuant to the Annual Conference with the Universities of Ontario represented on the Board.

(2) At the request of the Board, the Department of Education has agreed to provide the same machinery for holding the University Matriculation examinations as it employs for holding the Departmental examinations; but the responsibility for these examinations and the certificates issued devolves wholly on the University Matriculation Board and all communications requiring the attention of the Board should be addressed to the Secretary of the University Matriculation Board, Parliament Buildings, Toronto. It is further agreed that, if at any time the Universities make such a change in the organization and management of their Matriculation examinations as will entail additional expenditure, the consent of the Minister of Education shall be obtained before such expenditure be made a charge on his Department.

REGULATIONS OF THE BOARD.

2.—(1) The Board shall appoint an executive committee of not more than three members who shall, in the intervals between the meetings of the Board, perform such duties as may be assigned to them by the Board.

(2) There shall be two classes of examiners, (*a*) Examiners-in-chief, who shall set the question papers and read the scholarship and appeal answer papers, and (*b*) Associate Examiners, who shall read the other answer papers.

(3) The Board shall appoint as Examiners-in-chief persons of well-known ability as teachers in either a University or a High School. No Examiner-in-chief shall be engaged in the preparation of candidates for the examinations concerned.

(4) The Board shall appoint as Associate Examiners persons holding specialists' certificates according to the regulations of the Department of Education, or graduates of any British University. Such persons shall be actually engaged in teaching the subject which they are appointed to examine, and shall have had at least *two* years' successful experience as teachers in this Province.

(5) No Examiner or Associate Examiner shall be appointed for more than three consecutive years, except in the case of an examiner who has exceptional ability for the work and in order to secure the requisite degree of experience in each section.

(6) The number of Examiners-in-chief and Associate Examiners, from year to year, for each examination shall be determined by the Board.

(7) Each examiner-in-chief shall perform such duties as may be assigned to him by the Board, and shall be responsible for each question paper set by him.

(8) The Registrar of the Department of Education shall be Secretary of the University Matriculation Board and Chairman of the Board of Examiners-in-chief and of any committee thereof, and shall perform the duties set forth in Departmental Circular, Instructions No. 7.

(9) The Board shall appoint a Revising Committee, to consist of not more than three of the Examiners-in-chief, who shall consider the marks obtained by the candidates, make allowances where necessary, determine the results, and report their findings to the Board.

(10) The Board shall print and distribute circulars defining the Course of Study and Regulations governing Pass and Honour Matriculation as authorized by the Senate of the University of Toronto and agreed to by the Universities represented on this Board.

(11) If, after all the answer papers have been read, any examination paper should be adjudged by the Board to be easier or more difficult than required, the minimum on the paper shall be correspondingly increased or diminished.

(12) In connection with the Pass Junior Matriculation examination a report signed by all the members of the staff of the school concerned as to the standing of their candidates will be taken into account in determining the results. Only the names of the candidates who, in the opinion of the staff, have completed satisfactorily the courses for the examination shall be included in this report. Such a report must be received at the office of the Secretary not later than the first day of the examination to which the report refers.

(13) A candidate who makes the required aggregate, but who fails to obtain the minimum in a subject, may be passed at the discretion of the Board, provided he was reported by the staff of the school as competent and such report is found to be satisfactory.

(14) Uniform certificates of Pass Junior Matriculation, signed by the Secretary, shall be issued by the Board to successful candidates. These certificates will be accepted by each of the Universities represented on the Board in accordance with the regulations set forth in their respective calendars.

(15) Any candidate may have his papers re-examined on appeal to the Secretary of the Board not later than September 1st accompanied by a fee of $2.00, which will be refunded if the appeal is sustained. For an appeal received thereafter the fee shall be $5.00. No appeal, however, against scholarship awards will be entertained.

(16) Each appeal answer paper shall be read by the Examiner-in-chief who set the paper or by a substitute appointed by the Matriculation Board.

REGULATIONS OF THE UNIVERSITIES.

Subjects.

3.—(1) The subjects of Junior Matriculation are as follows:—Latin, English, History, Mathematics, and any two of the following: Greek, German, French, Experimental Science.

(2) Pass and honour papers will be set in each of these subjects.

(3) In certain cases foreign students may present themselves for examination in their native language instead of Greek, or German, or French, but only when the language has been approved by the Senate of the University concerned. The examination in an approved language will consist of two papers, similar in character to those in English.

(4) Each examination paper shall be valued at 100 marks.

The pass papers are as follows:

Latin Authors	Greek Authors .....
Latin Composition	Greek Accidence .....
English Literature	German Authors .....
English Composition	German Composition .....
British and Canadian History	French Authors .....
Greek and Roman History	French Composition .....
Algebra	Experimental Science—Physics ...
Geometry	Experimental Science—Chemistry.

Standards.

4.—(1) The pass standard is forty per cent. of the marks assigned to each paper with an average of sixty per cent.

(2) (*a*) A candidate who has obtained the average of sixty per cent. on all the papers, but has failed to obtain forty per cent. in at most three of these papers, may complete Junior Matriculation by passing on these papers at any one subsequent examination.

(*b*) A candidate who has obtained 40 per cent. on each of at least eight papers, with an average of 60 per cent. on the same, will be credited with these papers. In order to complete his Matriculation he must obtain at one subsequent examination, 40 per cent. on each of the remaining papers, with an average of 60 per cent.

(3) A candidate who has obtained partial Matriculation standing under the Regulations in force in a previous year may present himself for examination on the papers necessary to complete his Matriculation.

(4) Other candidates may be admitted to the examination for the purpose of qualifying for a standing other than that of Matriculation.

(5) Candidates who pass the complete examination for Matriculation in any one year will be granted certificates of Pass Junior Matriculation. All other candidates will receive statements of their standing.

(6) The First Class Honour standard is 75 per cent.; the Second Class, 66 per cent.; and the Third Class, 50 per cent. of the marks assigned to the subject. In addition to percentage in the subject a standard of 40 per cent. on each paper is also required.

SUBSTITUTION OF HONOUR MATRICULATION AND FACULTY ENTRANCE FOR PASS MATRICULATION PAPERS.

5.—(1) A candidate for Pass Matriculation standing at one examination may substitute one or more papers of the Honour Matriculation or the Faculty Entrance examinations for the corresponding Pass papers on the following conditions:—

(*a*) He shall obtain a minimum of 30 per cent. on each of such papers and an aggregate over all, equal to an average of 40 per cent. on the Honour Matriculation or the Faculty Entrance papers, together with an average of 60 per cent. on the Pass Matriculation papers.

(*b*) He shall on each of the Pass papers obtain the prescribed minimum of 40 per cent.

(*c*) Credit will not be given for less than eight papers.

(*d*) The papers in History for Honour Matriculation or Faculty Entrance, known as "History, First Course and History, Second Course," are, for purposes of substitution, held to cover the papers in Ancient History, and British and Canadian History respectively.

(2) A candidate for Pass Matriculation standing under these Regulations must make special application therefor to the Secretary of the University Matriculation Board.

MATRICULATION INTO OTHER FACULTIES.

6. Information as to the subjects and standards for Matriculation into faculties other than Arts may be obtained on application to the Registrar of the University concerned.

JUNE EXAMINATIONS.

7.—(1) Written examinations, as defined above, for Pass and Honour Junior Matriculation will be held by the University Matriculation Board, annually in June, subject to the conditions already stated, at each High School and Collegiate Institute, and at such other centres as may be

approved by the Minister of Education. If application is made to the University Senate the examination may, with the co-operation of the Minister of Education, be held at centres outside of Ontario.

(2) Candidates intending to write at any of these examinations at a University shall make application to the Registrar thereof before the 15th of May on an official form to be obtained from him. All other candidates shall make application before the same date to the local Public School Inspector, from whom the official form may be obtained.

(3) Scholarship candidates must also send a special application by the same date to the Registrar of the University concerned according to a form to be obtained from him.

(4) The official form of application shall include a certificate from the Principal of the School from which the candidate comes, or otherwise, that he has read carefully during the preceding year at least four suitable works in English Literature (both prose and poetry), in addition to those prescribed for the examination.

(5) (*a*) On application, accompanied by the additional fee prescribed ($3.00) candidates for the full Middle School Normal Entrance examination may have their marks considered for Matriculation purposes.

(*b*) Except as stated in (*a*) above, Middle School Normal Entrance papers will not be considered for Matriculation purposes.

SEPTEMBER SUPPLEMENTAL EXAMINATION.

8.—(1) A Supplemental examination for Pass Junior and for the Mathematics of Honour Junior Matriculation will be held in September by the University Matriculation Board at the following centres:—

(*a*) The University of Toronto; Queen's University, Kingston; McMaster University, Toronto; Western University, London.

(*b*) Any of the following, upon request:—Windsor, Chatham, Sarnia, St. Thomas, Woodstock, Brantford, Simcoe, Cayuga, Welland, St. Catharines, Hamilton, Goderich, Stratford, Berlin, Guelph, Walkerton, Owen Sound, Orangeville, Barrie, Whitby, Bowmanville, Cobourg, Lindsay, Peterborough, Belleville, Picton, Napanee, Brockville, Kemptville, Morrisburg, Cornwall, Alexandria, Vankleek Hill, Ottawa, Smith's Falls, Renfrew, Bracebridge, North Bay, Sault Ste. Marie, Port Arthur, Haileybury.

(*c*) Elsewhere in Ontario, upon request, and if approved by the University Matriculation Board.

(*d*) Elsewhere in Canada upon request of one of the aforesaid Universities and with the approval of the Board.

(2) Applications to write on the examination, accompanied by the necessary fee, shall be received at the office of the Secretary of the Board as follows:—

(*a*) Up to September 1st, from those who wish to write at any centre authorized in Ontario.

(*b*) Up to August 25th, from those who wish to write elsewhere in Ontario.

(*c*) Up to August 1st, from those who, through one of the aforesaid Universities, make application to write outside of the Province of Ontario.

(3) On payment of the required fee, with one dollar additional, a candidate who has failed to make application as specified in the foregoing regulation (2) may be admitted to the examination at a centre already established, provided the accommodation is adequate and the number of question papers sufficient.

(4) The subjects of the examination, the prescription of work and the standard required shall be the same as for the June Pass Junior Matriculation examination of the same year.

(5) The following are eligible to become candidates at this examination:—

(*a*) Those who are applicants for the complete Matriculation examination.

(*b*) Those who are completing the Matriculation examination under the regulations in force in any previous year.

(*c*) Those who are applicants for Matriculation standing in certain papers.

(6) (*a*) Candidates may write at any one of the four University centres mentioned in (1) (*a*) without any additional cost to themselves.

(*b*) Candidates who write at any other centre, in addition to paying the fee required in Section 10, must also defray the local expenses of conducting the examination. These include the cost of supplies, any charge for the examination room, express charges, and the allowance to the Presiding Officer at $6 per day.

(7) Forms of application and copies of the time-table may be obtained, after July 1st, on application to the Secretary of the Board.

SPECIAL MATRICULATION CONDITIONS.

9.—(1) A candidate who is actually engaged in a mercantile, industrial or other occupation may proceed to pass Junior Matriculation under the following conditions:

(*a*) He may present himself for one or more papers at any June or September examination.

(*b*) At any such examination he will receive credit for a paper or papers on obtaining 60 per cent. of the aggregate marks assigned to such paper or papers with a minimum of 40 per cent. on each paper.

(*c*) Matriculation must be completed under these conditions within four consecutive years.

(2) In order to secure credit for the paper or papers written, a candidate who desires to matriculate under these regulations must, immediately on receipt of his statement of marks, return the same to the Secretary of the Board, accompanied by a certificate from his employer to the following effect:—

....., 191..

I, ..., do hereby certify that.....
..... was in my employ from .....to....
..... in the capacity of ....., and that this employment made it impossible for him to attend the regular day sessions of a secondary school.

My business is that of .....
located at .....
(Give business address in full.)

.....
(Signature in full.)

To the Secretary of the
University Matriculation Board, Parliament Buildings.

(3) Exceptional cases, for which provision is not made under these regulations, will be determined, as they arise, by the University Matriculation Board.

FEES.

10. The following are the fees:—

(1) June examinations.		
(*a*) Junior Matriculation		$8 00
(*b*) Matriculation standing in certain papers	Not more than four papers...	3 00
	More than four papers.....	8 00
(*c*) Honour Matriculation in certain papers	Not more than four papers....	5 00
	More than four papers.....	10 00
(*d*) Scholarship Matriculation		10 00
(2) September Supplemental examination.		
Pass papers, $2.00 each; five papers or more		10 00
Honour papers, one or two papers, $5.00; three papers ...		6 00
(3) Appeal fee. Not later than Sept. 1, $2.00; after Sept. 1..		5 00
(4) Duplicate of lost certificate		2 00
(5) Certificate of complete Matriculation on the results of examinations taken in different years		5 00

PRESCRIPTION OF WORK.

For Pass.

Greek.

Translation into English of passages from the prescribed texts, with questions thereon.

Translation at sight of simple narrative passages similar to the Xenophon prescribed.

Questions on Greek accidence and on the common rules of Greek syntax to test the candidate's accuracy and comprehension in such matters as are needful for the intelligent reading of his texts.

The following are the prescribed texts:—

1918 and 1920: Xenophon, Philpotts and Jerram, Easy Selections from Xenophon, chaps 3, 4, 5; Homer Iliad, VI., 66-118 and 237 to the end.

1919: Xenophon, Philpotts and Jerram, Easy Selections from Xenophon, chaps. 3, 4, and 5; Homer, Iliad, I., 1-350.

Two papers will be set: (1) Prescribed texts; (2) translation at sight, accidence and syntax.

Latin.

Translation at sight of passages of average difficulty from Cæsar, upon which special stress will be laid.

Translation, with questions, from a prescribed portion of Virgil's Æneid.

The marks assigned for the translation from prescribed authors shall not be more than twenty-five per cent. of the total marks assigned to the Latin papers.

Questions on Latin accidence.

Translation into Latin of English sentences involving a knowledge of the following principles of Latin syntax: The common uses of the cases; the accusative with the infinitive; the subjunctive in simple sentences; final and result clauses; the law of the sequence of tenses; the indirect question; verbs of fearing, doubting and hindering; the use of the participle, gerund and gerundive, active and passive periphrastic; indirect discourse; and the common forms of the conditional sentence.

The vocabulary will be taken from the prescribed portion of Cæsar and special stress will be laid upon this part of the examination.

Examination upon a short prescribed portion of Cæsar to test the candidate's knowledge of Latin syntax, and the power of idiomatic translation.

The following are the texts prescribed:—

1918 and 1919: Cæsar, Book IV., chaps. 20-38, and Book V., chaps. 1-23; Virgil, Æneid, Book I., vv. 1-510.

1920: Cæsar, De Bello Gallico, Book IV., chaps. 20-38, and Book V., chaps. 1-23; Virgil, Æneid, Book II., vv. 1-505.

Two papers will be set: (1) Translation at sight, Virgil, and accidence. (2) Translation into Latin, syntax and idiomatic translation from prescribed Cæsar, etc.

English.

Composition: An essay on one of several themes set by the examiners. In order to pass in this subject, legible writing, correct spelling and punctuation, and idiomatic and grammatical construction of sentences are indispensable. The candidate should also give attention to the structure of the whole essay, the effective ordering of the thought, and the active

employment of a good English vocabulary. About two pages of foolscap is suggested as the proper length for the essay; but quality, not quantity, will be mainly regarded.

One examination paper.

LITERATURE: Such questions only will be set as may serve to test the candidate's familiarity with, and intelligent and appreciative comprehension of, the prescribed texts. The candidate will be expected to have memorized the passages prescribed below. In addition to the questions on the prescribed selections others will be set on a "sight passage" to test the candidate's ability to interpret literature for himself.

The candidate shall produce satisfactory proof, by the certificate of the principal of the school from which he comes or otherwise that he has read carefully, during the preceding year, at least four suitable works in English literature (both prose and poetry) in addition to those prescribed below for examination.

One examination paper.

1918: *Wordsworth,* Michael, Influence of Natural Objects, Nutting, Elegiac Stanzas, To the Rev. Dr. Wordsworth, To the Cuckoo, "Bright flower, whose home," and the following eight sonnets: "It is not to be thought of", "Dark and more dark the shades of evening fell", "O friend I know not", "Milton, thou shouldst", "Surprised by joy—impatient as the wind", "Hail twilight, sovereign of our peaceful hour", "I thought of Thee, my partner and my guide", "Such age, how beautiful"; *Tennyson,* The Epic and Morte d'Arthur, Œnone, The Brook, and the following sections of "In Memoriam": XXVII, LXIV, LXXXIII, LXXXVI, CI, CXIV, CXV, CXVIII, CXXIII; *Shakespeare,* Merchant of Venice.

Passages for memorization: *Wordsworth*: "To the Cuckoo"; "It is not to be thought of"; "O friend, I know not"; "Milton, thou shouldst"; "Hail twilight, sovereign of our peaceful hour"; "I thought of Thee, my partner and my guide."

Tennyson: "Morte d'Arthur, ll. 246-255; Œnone, ll. 1-15, ll. 144-150, The lyric stanzas in "The Brook"; "In Memoriam": LXIV, LXXXIII, LXXXVI, CI, CXV, CXVIII.

Shakespeare—The Merchant of Venice:—

Act I, Sc. 1, ll. 79- 99.	"Let me play . . . their brothers fools."
Act II, Sc. 9, ll. 36- 49.	"Who chooseth me . . . to be new varnished."
Act IV, Sc. 1, ll. 184-205.	"The quality of mercy . . . the deeds of mercy."
Act V, Sc. 1, ll. 54- 65.	"How sweet the moonlight . . . cannot hear it."
Act V, Sc. 1, ll. 102-108.	"The crow doth sing . . . true proportion."

1919: *Coleridge*: The Ancient Mariner; *Tennyson*: The Lotos Eaters, Ulysses, "Of old sat Freedom," Locksley Hall, Songs from The Princess, Ode on the Duke of Wellington, Charge of the Light Brigade, Enoch Arden; *Shakespeare*: Julius Cæsar.

Selections for Memorization.

Coleridge: The Ancient Mariner, ll. 354-372, "Around . . . singeth a quiet tune"; ll. 599-617, "O wedding guest . . . loveth all."

Tennyson: The Lotos Eaters, ll. 10-28; Stanzas I, III, of the Choric Song; Ulysses, ll. 18-32 and ll. 44-61; "Of Old Sat Freedom"; "Sweet and low"; "The Splendour Falls"; The Charge of the Light Brigade.

Shakespeare: Julius Cæsar.

Act I, Sc. 1, ll. 40-60. "O you hard hearts . . . on this ingratitude."
Act III, Sc. 1, ll. 148-163. "O mighty Cæsar . . . spirits of this age."
Act III, Sc. 2, ll. 173-196. "If you have tears . . . flourished over us."
Act IV, Sc. 2, ll. 19- 27. "Thou has described . . . in the trial."
Act V, Sc. 5, ll. 68- 75. "This was the noblest . . . was a man."

1920: *Tennyson*: The Lady of Shalott, St. Agnes' Eve, "Come not when I am dead," "Break, break, break," In the Valley of Cauteretz, In Memoriam, XXXI, XXXII, XXXVI, LXXV, LXXVI, C, CXI; *Browning*: "All service ranks the same with God," The Italian in England, My Last Duchess, Cavalier Tunes, The Boy and the Angel, Love among the Ruins, Home Thoughts from Abroad, Up at a Villa, The Guardian Angel, Prospice; *Matthew Arnold,* Sohrab and Rustum; *Shakespeare,* Macbeth.

Selections for Memorization.

Tennyson: The Lady of Shalott, Part I, St. Agnes' Eve, "Break, break, break", In the Valley of Cauteretz.

Browning: "All service ranks the same with God", Home Thoughts from Abroad, Prospice; Love Among the Ruins.

Macbeth.

Act I, Sc. 5, ll. 16-31. *Lady M.* "Glamis thou art . . . crown'd withal."
Act I, Sc. 7, ll. 1-28. *Macb.* "If it were done . . . on the other."
Act II, Sc. 1, ll. 33-64. *Macb.* "Is this a dagger . . . to hell."
Act III, Sc. 2, ll. 4-26. *Lady M.* "Nought's had . . . him further."
Act III, Sc. 2, ll. 45-56. *Macb.* "Be innocent . . . go with me."
Act V, Sc. 3, ll. 22-28. *Macb.* "I have lived . . . dare not."
Act V, Sc. 3, ll. 39-45. *Macb.* "Cure her . . . the heart?"
Act V, Sc. 5, ll. 16-28. *Sey.* "The Queen . . . signifying nothing."

German.

The candidate's knowledge of German will be tested by: (1) simple questions on grammar; (2) the translation of simple passages from English into German; (3) translation at sight of easy passages from modern German, and (4) an examination on the following texts:—

The texts contained in the New High School German Reader with the exception of Von Fallensleben, Deutchland über Alles.

1918 and 1920: Hauff, Das kalte Herz.

1919: Baumbach, Waldnovellen.

Two papers will be set: (1) Prescribed texts and translation at sight; questions on grammar; (2) the translation of English into German.

French.

The candidate's knowledge of French will be tested by: (1) simple questions on grammar; (2) the translation of simple passages from English into French; (3) translation at sight of easy passages from Modern French, and (4) an examination on the following texts:—

The texts contained in the New High School French Reader.

1918: Daudet, La belle Nivernaise.

1919: Augier et Sandeau, La Pierre de touche.

1920: Bazin, Six Contes (Oxford Junior French Series).

Two papers will be set: (1) Prescribed texts and translation at sight; questions on grammar; (2) the translation of English into French.

History.

British History.—Great Britain and Canada from 1763 to 1885. The geography relating to the history prescribed. One examination paper.

This paper will include optional questions on the causes of the present war, the interests at stake, and the relations of the different nations directly and indirectly concerned.

Ancient History.—General outlines of the History of Greece to the death of Alexander and of the history of Rome to the death of Augustus, with a brief outline of the art, literature, philosophy, and social life of the Greeks and Romans.

The geography relating to the history prescribed.

One examination paper.

Mathematics.

Algebra.—Elementary rules; highest common measure; lowest common multiple; fractions; square root; simple equations of one, two and three unknown quantities; indices; surds; quadratics of one and two unknown quantities.

One examination paper.

GEOMETRY.—A.—CONSTRUCTIONS.

To construct a triangle with sides of given lengths.

To construct an angle equal to a given rectilineal angle.

To bisect a given angle.

To bisect a given straight line.

To draw a line perpendicular to a given line from a given point in it.

To draw a line perpendicular to a given line from a given point not in the line.

Locus of a point equidistant from two given lines.

Locus of a point equidistant from two given points.

To draw a line parallel to another, through a given point.

To divide a given line into any number of equal parts.

To describe a parallelogram equal to a given triangle, and having an angle equal to a given angle.

To describe a parallelogram equal to a given rectilineal figure, and having an angle equal to a given angle.

On a given straight line to describe a parallelogram equal to a given triangle, and having an angle equal to a given angle.

To find the centre of a given circle.

From a given point to draw a tangent to a given circle.

On a given straight line to construct a segment of a circle containing an angle equal to a given angle.

From a given circle to cut off a segment containing an angle equal to a given angle.

In a circle to inscribe a triangle equiangular to a given triangle.

To find locus of centres of circles touching two given lines.

To inscribe a circle in a given triangle.

To describe a circle touching three given straight lines.

To describe a circle about a given triangle.

About a given circle to describe a triangle equiangular to a given triangle.

To divide a given line similarly to another given divided line.

To find the fourth proportional to three given lines.

To describe a polygon similar to a given polygon, and with the corresponding sides in a given ratio.

To find the mean proportional between two given straight lines.

To construct a polygon similar to a given polygon, and such that their areas are in a given ratio.

To describe a polygon of a given shape and size.

B.—Theorems.

The sum of the angles of any triangle is equal to two right angles.

The angles at the base of an isosceles triangle are equal, with converse.

If the three sides of one triangle be equal, respectively, to the three sides of another, the triangles are equal in all respects.

If two sides and the included angle of one triangle be equal to two sides and the included angle of another triangle, the triangles are equal in all respects.

If two angles and one side of a triangle be equal to two angles and the corresponding side of another, the triangles are equal in all respects.

If two sides and an angle opposite one of these sides be equal, respectively, in two triangles, the angles opposite the other pair of equal sides are either equal or supplemental.

The sum of the exterior angles of a polygon is four right angles.

The greater side of any triangle has the greater angle opposite it.

The greater angle of any triangle has the greater side opposite it.

If two sides of one triangle be equal respectively to two sides of another, that with the greater contained angle has the greater base, with converse.

If a transversal fall on two parallel lines, relations between angles formed, with converse.

Lines which join equal and parallel lines towards the same parts are themselves equal and parallel.

The opposite sides and angles of a parallelogram are equal and the diagonal bisects it.

Parallelograms on the same base, or on equal bases, and between the same parallels are equal.

Triangles on the same base, or on equal bases, and between the same parallels are equal.

Triangles equal in area, and on the same base, are between the same parallels.

If a parallelogram and a triangle be on the same base, and between the same parallels, the parallelogram is double the triangle.

Expressions for area of parallelogram, and the area of a triangle.

The complements of parallelograms about the diagonal of any parallelogram are equal.

The square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the sides.

If a straight line be divided into any two parts, the sum of the squares on the parts, together with twice the rectangle contained by the parts, is equal to the square on the whole line.

The square on a side of any triangle is equal to the sum of the squares on the two other sides + twice the rectangle contained by either of these sides and the projection of the other side on it.

If more than two equal straight lines can be drawn from the circumference of a circle to a point within it, that point is the centre.

The diameter is the greatest chord in a circle, and a chord nearer the centre is greater than one more remote. Also the greater chord is nearer the centre than the less.

The angle at the centre of a circle is double the angle at the circumference on the same arc.

The angles in the same segment of a circle are equal, with converse.

The opposite angles of a quadrilateral inscribed in a circle are together equal to two right angles, with converse.

The angle in a semicircle is a right angle; in a segment greater than a semicircle less than a right angle; in a segment less than a semicircle greater than a right angle.

A tangent is perpendicular to the radius to the point of contact; only one tangent can be drawn at a given point; the perpendicular to the tangent at the point of contact passes through the centre; the perpendicular from centre on tangent passes through the point of contact.

If two circles touch, the line joining the centres passes through the point of contact.

The angles which a chord drawn from the point of contact makes with the tangent, are equal to the angles in the alternate segments.

The rectangles under the segments of intersecting chords are equal.

If $OA.OB=OC^2$, OC is a tangent to the circle through A, B and C.

Triangles of the same altitude are as their bases.

A line parallel to the base of a triangle divides the sides proportionally, with converse.

If a vertical angle of a triangle be bisected, the bisector divides the base into segments that are as the sides, with converse.

The analogous proposition when the exterior angle at the vertex is bisected, with converse.

If two triangles are equiangular, the sides are proportional.

If the sides of two triangles are proportional, the triangles are equiangular.

If the sides of two triangles about equal angles are proportional, the triangles are equiangular.

If two triangles have an angle in each equal, and the sides about two other angles proportional, the remaining angles are equal or supplemental.

Similar triangles are as the squares on corresponding sides.

The perpendicular from the right angle of a right-angled triangle on the hypotenuse divides the triangle into two which are similar to the original triangle.

In equal circles, angles, whether at the centres or circumferences, are proportional to the arcs on which they stand.

The areas of two similar polygons are as the squares on corresponding sides.

If three lines be proportional, the first is to the third as the figure on the first to a similar figure on the second.

Questions and easy deductions on the preceding constructions and theorems.

It is recommended that the study of formal demonstrative Geometry be preceded by a course in Practical Geometry, extending over not more than a year, and embracing the following:—

Definitions; fundamental geometric conceptions and principles; use of simple instruments, as compasses, protractor, graduated rule, etc.; measurement of lines and angles, and construction of lines and angles of given numerical magnitude; accurate construction of figures; some leading propositions in plane geometry reached by induction as a result of accurate construction of figures; deduction also employed as principles are reached and assured. At the examination questions may be given in Practical Geometry, the constructions being such as naturally

spring from the prescribed course. Candidates must provide themselves with a graduated ruler, compasses, set-square and protractor.

In the formal deductive Geometry modifications of Euclid's treatment of the subject will be allowed, though not required, as follows:—

The employment of the "hypothetical construction."

The free employment of the method of superposition, including the rotation of figures about an axis, or about a point in a plane.

A modification of Euclid's parallel postulate.

A treatment of ratio and proportion restricted to the case in which the compared magnitudes are commensurable.

One examination paper.

Experimental Science.

CHEMISTRY.—An experimental study of the following elements and their more important compounds: hydrogen, oxygen, sulphur, sodium, potassium, nitrogen, chlorine, bromine, iodine, carbon, calcium. The course of work should be arranged so as to give the pupils a knowledge of the following: mixtures, solutions, compounds, and elements, and their various properties and reactions; acids, bases, and salts. Fundamental laws and principles, as: conservation of mass, definite proportions, multiple proportions, valency, proportions by volume in which gases react. The quantitative meaning and use of chemical symbols, formulae and equations. Chemical nomenclature. Simple quantitative experiments and problems. The application of chemistry to the industries illustrated by an account of the commercial manufacture and use of some of the more important substances included in this course.

One examination paper.

PHYSICS.

An experimental course defined as follows, and including simple problems:

Electricity and Magnetism.—Laws of magnetic attraction and repulsion; magnetic lines of force; phenomena of induction; inclination and declination of the compass. Production and detection of electricity. Electrical conductors and insulators; electroscopes and their construction; electrical conduction through air; radioactivity illustrated by means of uranium and thorium salts. Electrical conduction in liquids; electrolysis; electroplating and electrotyping. Voltameters, storage and voltaic cells; simple notions of potential; Ohm's Law; electrical units; galvanometers and voltmeters; laws of resistance; divided circuits, experimental determination of current strength, resistance, and electromotive force; current induction and its general laws; the transformer, the induction coil, dynamo, telephone, motor; ether waves, Roentgen rays, and wireless telegraphy.

HEAT.—Nature and sources of heat. Relation between volume and the temperature of a gas (Charles' Law). Absolute temperature. Change of state. Latent heat; specific heat; transmission of heat.

Sound.—Vibrations: transversal vibrations, illustrated with pendulums, rods, strings, membranes, plates; longitudinal vibrations illustrated with rods, strings and columns of air. Production, propagation, and detection of sound waves. Velocity of sound, pitch; standard forks (acoustical C=512, musical A=870). Vibration of air in organ pipes; nodes and loops in vibrating air columns and in vibrating strings; wave lengths and velocity relations. Laws of vibration of strings; interference phenomena; beats, resonance, reflection and absorption of sound.

Light.—The ether, the wave theory of light, rectilinear propagation, image through a pin-hole, beam, pencil; photometry; shadow and grease spot photometers. Reflection and scattering of light; laws of reflection, images in plane mirrors, concave and convex mirrors; drawing images, Refraction, laws, and index of refraction. Total reflection. Path through a prism. Lenses; drawing image produced by a lens by use of critical rays. Simple microscope. Dispersion and colour. Spectrum; recomposition of light. Camera.

One examination paper.

For Honours.

Greek.

Translation into English of passages from the prescribed texts, with questions thereon.

Translation at sight of prose passages of average difficulty from Xenophon's historical works.

Translation into Greek of sentences (based upon Xenophon's vocabulary) to test the candidate's scholarship in matters of accidence, syntax and phraseology.

The following are the prescribed texts:—

1918, 1919 and 1920: Xenophon, Hellenica (Philpotts' Selections, sections I. and II.), Homer, Iliad I., 1-350; III., 121-244; VI., 66-118, and 237 to the end; Odyssey VI. and IX.

Two papers will be set: (1) prescribed texts; (2) translation at sight and Greek prose composition.

Latin.

Translation into English of passages from prescribed texts.

Translation at sight of passages of average difficulty from Cæsar.

Grammatical questions on the passages from prescribed texts and such other questions as arise naturally from the context.

Translation into Latin of English sentences to illustrate Latin syntax and of a continuous passage of English narrative, similar to Cæsar.

The following are the prescribed texts:—

1918: Caesar, De Bello Gallico, Book V; Cicero, In Catilinam I and III; Virgil, Æneid, Book IX, 1-449.

Horace, Odes as follows: Book I, 1, 2, 4, 5, 9, 10, 14, 22, 24, 31, 38; Book II, 3, 10, 14, 15, 16, 17, 18, 20.

1919: Caesar, De Bello Gallico, Book V; Cicero, In Catilinam I and III; Virgil, Æneid, Book X, 1-509.

Horace, Odes as follows: Book III, 1, 2, 8, 9, 13, 18, 21, 23, 29, 30; Book IV, 3, 5, 7, 12, 15.

1920: Caesar, De Bello Gallico, Book V; Cicero, Pro Lege Manilia; Virgil, Æneid, Book X, 1-509. Horace, the same as for 1919.

Two examination papers.

(1) Latin Prose Composition and Caesar.

(2) Cicero, Horace, Virgil, and Sight Translation.

English.

COMPOSITION: An essay of one of several themes set by the examiners.

One examination paper.

LITERATURE: The candidate will be expected to have memorized the passages prescribed below. Besides questions to test the candidate's familiarity with, and comprehension of, the following selections, questions may also be set to determine within reasonable limits his power of appreciating literary art.

The candidate shall produce satisfactory proof by the certificate of the principal of the school from which he comes or otherwise that he has read carefully, during the preceding year, at least four suitable works in English literature (both prose and poetry) in addition to those prescribed below for examination.

One examination paper.

1918: *Wordsworth,* Michael, Influence of Natural Objects, Nutting, Elegiac Stanzas, To the Rev. Dr. Wordsworth, To the Cuckoo, "Bright flower, whose home," and the following eight sonnets: "It is not to be thought of," "Dark and more dark the shades of evening fell", "O friend I know not", "Milton, thou shouldst", "Surprised by joy—impatient as the wind", "Hail twilight, sovereign of our peaceful hour", "I thought of Thee, my partner and my guide", "Such age, how beautiful"; *Tennyson,* The Epic and Morte d'Arthur, Œnone, The Brook, and the following sections of "In Memoriam": XXVII, LXIV, LXXXIII, LXXXVI, CI, CXIV, CXV, CXVIII, CXXIII; *Shakespeare,* Merchant of Venice, Henry IV, Part 1.

Passages for memorization: *Wordsworth*: "To the Cuckoo"; "It is not to be thought of"; "O friend, I know not"; "Milton, thou shouldst"; "Hail twilight, sovereign of our peaceful hour"; "I thought of Thee, my partner and my guide".

Tennyson: "Morte d'Arthur, ll. 246-255; Œnone, ll. 1-15, ll. 144-150, The lyric stanzas in the "Brook"; "In Memoriam": LXIV, LXXXIII, LXXXVI, CI, CXV, CXVIII.

Shakespeare—The Merchant of Venice:—

Act I, Sc. 1, ll.	79- 99.	"Let me play . . . their brothers fools."
Act II, Sc. 9, ll.	36- 49.	"Who chooseth me . . . to be new varnished."
Act IV, Sc. 1, ll.	184-205.	"The quality of mercy . . . the deeds of mercy."
Act V, Sc. 1, ll.	54- 65.	"How sweet the moonlight . . . cannot hear it."
Act V, Sc. 1, ll.	102-108.	"The crow doth sing . . . true proportion."

1919: *Coleridge,* The Ancient Mariner; *Tennyson,* The Lotos Eaters, Ulysses, "Of old sat Freedom," Locksley Hall, Songs from the Princess, Ode on the Duke of Wellington, Charge of the Light Brigade, Enoch Arden; *Shakespeare,* Julius Cæsar, Midsummer Night's Dream.

Selections for Memorization.

As for Pass Matriculation. See page 12.

1920: *Tennyson*: The Lady of Shalott, St. Agnes' Eve, "Come not when I am dead," "Break, break, break," In the Valley of Cauteretz, In Memoriam, XXXI, XXXII, XXXVI, LXXV, LXXVI, C, CXI; *Browning*: "All service ranks the same with God," My Last Duchess, The Italian in England, Cavalier Tunes, The Boy and the Angel, Love among the Ruins, Home Thoughts from Abroad, Up at a Villa, The Guardian Angel, Prospice; *Matthew Arnold,* Sohrab and Rustum; *Shakespeare,* Macbeth, As You Like It.

Selections for Memorization.

Tennyson and Browning: As for Pass Matriculation, omitting "The Lady of Shalott, Part I," and "Love Among the Ruins." See page 12.

Macbeth: As for Pass Matriculation.

As You Like It.

Act II, Sc. 1, ll. 1-18. Duke S. "Now, my co-mates . . . change it."

Act. II, Sc. 5 The Songs.

Act II, Sc. 7, ll. 139-166. *Jaq.* "All the world's . . . sans everything."

Act II, Sc. 7, ll. 174-190. *Amiens.* The Song.

German.

The prescription of work in grammar, the translation of English into German and sight translation, is the same for honours as for pass, but the examination will be of a more advanced character.

The following are the prescribed texts:—
1918 and 1920: Baumbach, Der Schwiegersohn; Benedix, Eigensinn.
1919: Keller Legenden, Wilhelmi, Einer musz heiraten.

French.

The prescription of work in grammar, the translation of English into French and sight translation, is the same for honours as for pass, but the examination will be of a more advanced character.

The following are the prescribed texts:—
1918: Erckmann-Chatrian, Madam Thérèse (Edited by Bôcher, Henry Holt and Co.).
1919: Erckmann-Chatrian, Waterloo (Macmillan's Advanced French Texts).
1920: Erckmann-Chatrian, Histoire d'un homme du peuple, (Oxford Modern French Series).

History.

Outline of Mediaeval History from the Barbarian Invasion to the Discovery of America. Study in greater detail of the period from the Discovery of America to the death of Queen Elizabeth, 1492-1603. The geography relating to the history prescribed. One examination paper.

Outlines of Modern History from the death of Queen Elizabeth to the Treaty of Paris, 1603-1763. Study of Modern History in detail, 1763-1885. The geography relating to the history prescribed. One examination paper.

These papers will include optional questions on the causes of the present war, the interests at stake, and the relations of the different nations directly or indirectly concerned.

Mathematics.

NOTE.—Candidates at the examinations in Honour Mathematics will be expected to be able to use Logarithmic and Trigonometric tables. Books of tables shall be provided for the examinations, one for each candidate, either by the school concerned or by the candidates.

ALGEBRA: Elementary rules; highest common measure; lowest common multiple; fractions; square root; simple equations of one, two, and three unknown quantities; indices, surds, quadratics of one and two unknown quantities; theory of divisors; ratio, proportion and variation; progressions; notation; permutations and combinations; binomial theorem; interest forms; annuities.

One examination paper.

TRIGONOMETRY.—Trigonometrical ratios with their relations to each other; sines, etc., of the sum and difference of angles with deduced formulas; use of logarithms; solution of triangles; expressions for the area of triangles; radii of circumscribed, inscribed and escribed circles.

One examination paper.

PROBLEMS: One paper.——For scholarship candidates only.

GEOMETRY: A.—Exercises on the course prescribed for the pass examination with special reference to the following topics:—loci; maxima and minima; the system of inscribed, escribed and circumscribed circles of a triangle, with metrical relations; radical axis.

B.—The following additional propositions in Synthetic Geometry, with exercises thereon:—

To divide a given straight line internally and externally in medial section.

To describe a square that shall be equal to a given rectilineal figure.

To describe an isosceles triangle having each of the angles at the base double of the third angle.

To inscribe a regular pentagon in a given circle.

The squares on two sides of a triangle are together equal to twice the square on half the third side and twice the square on the median to that side.

If A B C be a triangle, and A be joined to a point P of the base such that B P : P C = m : n, then n A B^2 + m A C^2 = (m + n) A P^2 + n B P^2 + m P C^2.

In a right-angled triangle the rectilineal figure described on the hypotenuse is equal to the sum of the similar and similarly described figures on the two other sides.

If the vertical angle of a triangle be bisected by a straight line which also cuts the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the segments of the base, together with the square on the straight line which bisects the angle.

If from the vertical angle of a triangle a straight line be drawn perpendicular to the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the perpendicular and the diameter of the circle described about the triangle.

The rectangle contained by the diagonals of a quadrilateral inscribed in a circle is equal to the sum of the two rectangles contained by its opposite sides.

Two similar polygons may be so placed that the lines adjoining corresponding points are concurrent.

If a straight line meet the sides B C, C A, A B, of a triangle A B C in D, E, F, respectively, then B D. C E. A F = D C. E A. F B, and conversely. (Menelaus' Theorem.)

If straight lines through the angular points A, B, C of a triangle are concurrent, and intersect the opposite sides in D, E, F, respectively, then B D. C E. A F = D C. E A. F B, and conversely. (Ceva's Theorem.)

If a point A lie on the polar of a point B with respect to a circle, then B lies on polar of A.

Any straight line which passes through a fixed point is cut harmonically by the point, any circle, and the polar of the point with respect to the circle.

In a complete quadrilateral each diagonal is divided harmonically by the two other diagonals, and at the angular points through which it passes.

C.—ELEMENTARY ANALYTICAL GEOMETRY: Axes of co-ordinates. Position of a point in plane of reference.

Transformation of co-ordinates—origin changed, or axes (rectangular) turned through a given angle.

$\pm 2A = x_1(y_2 - y_3) + \ldots + \ldots$

Co-ordinates of point dividing line joining $P_1(x_1,\ y_1)$ and $P_2(x_2,\ y_2)$, in ratio $m : n$ are

$$x = \frac{mx_2 + nx_1}{m+n},\quad y = \frac{my_2 + ny_1}{m+n}.$$

$(P_1P_2)^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2$

Equations of straight lines.

$$\left.\begin{aligned} &\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}. \\ &\frac{x}{a} + \frac{y}{b} = 1. \end{aligned}\right\}$$ Line defined by two points through which it passes.

$$\left.\begin{aligned} &\frac{x-a}{\cos\theta} = \frac{y-b}{\sin\theta} = r. \\ &y = mx + b. \\ &y = m(x-a). \\ &x\cos\alpha + y\sin\alpha = p. \end{aligned}\right\}$$ Line defined by one point through which it passes and by its direction.

General equation of 1st degree, $Ax + By + C = 0$, represents a straight line.

Any line through $(x_1,\ y_1)$ is

$$A(x - x_1) + B(y - y_1) = 0.$$

If θ be angle between $Ax + By + C = 0$ and $A'x + B'y + C' = 0$, then

$$\tan\theta = \frac{A'B - AB'}{AA' + BB'}.$$

Conditions of $\perp$-rity, $AA' + BB' = 0$.

Condition of $\parallel$ ism, $\frac{A}{A'} = \frac{B}{B'}$.

Distance from $(a,\ b)$ to $Ax + By + C = 0$, in direction whose direction cosines are $(l,\ m)$, is

$$-\frac{Aa + Bb + C}{Al + Bm}.$$

$\perp$ r distance from $(a,\ b)$ on $Ax + By + C = 0$, is

$$\pm\frac{Aa + Bb + C}{\sqrt{A^2 + B^2}}.$$

THE CIRCLE—

Equations in forms :

$$x^2 + y^2 = r^2.$$

$$(x-a)^2 + (y-b)^2 = r^2.$$

$$x^2 + y^2 - 2rx = 0.$$

General equation : $x^2 + y^2 + 2Ax + 2By + C = 0$

or $(x+A)^2 + (y+B)^2 = A^2 + B^2 - C$

represents a circle with centre $(-A, -B)$ and radius $\sqrt{A^2 + B^2 - C}$.

Tangent at (x', y') to $x^2 + y^2 = r^2$ is $xx' + yy' = r^2$.

Normal is $\frac{x}{x'} = \frac{y}{y'}$.

Tangent in form $y = mx \pm r\sqrt{1+m^2}$.

Pole being (x', y'), polar is $xx' + yy' = r^2$.

If pole move along a line, polar turns about pole of that line.

Square of tangent from (x', y') to $x^2 + y^2 + 2Ax + 2By + C = 0$

is $x'^2 + y'^2 + 2Ax' + 2By' + C$.

Radical axis of $x^2 + y^2 + 2Ax + 2By + C = 0$,

$$x^2 + y^2 + 2A'x + 2B'y + C' = 0.$$

Easy exercises on the preceding propositions.

One examination paper.

Physics.

1. MECHANICS: Measurement of velocity; uniformly accelerated rectilinear motion; momentum; energy, force; metric units of force, work, energy, and power. Equilibrium of forces acting at a point; triangle, parallelogram, and polygon of forces; parallel forces; principle of moments; centre of gravity; laws of friction; numerical examples.

2. PROPERTIES OF MATTER: An experimental course illustrating the following topics:—transmutation of energy; conservation of energy; kinetic theory of matter; heat, a mode of motion; absolute temperature; mechanical equivalent of heat.

Fluid pressure at a point; pressure on a horizontal plane, pressure on an inclined plane, resultant vertical pressure and resultant horizontal pressure, when liquid is under air pressure and when it is not; transmission of pressure; Bramah press; calculations relating to the preceding.

NOTE.—The examination problems based on the foregoing prescription in Mechanics and Properties of Matter, will be of a somewhat less difficult character than those hitherto set.

The Flow of Fluids and Related Phenomena.—An experimental course defined as follows: definition of stream line; definition of tube of flow; definition of steady motion; velocity of efflux from an orifice in a vessel containing water:—$V^2 = 2gh$ (Torricelli's theorem); pressure along a tube of flow given by $\rho + \frac{1}{2}\rho V^2 + g\rho h =$ a constant (Bernoulli's theorem); applications of Bernoulli's theorem to explain the principle of an atomiser, a bunsen filter pump, a steam injector, the curve of flight of a ball, the Venturi water meter.

Surface Tension and Capillary Phenomena.—A simple experimental treatment of the following topics: Experiments showing the existence of surface tension in liquids; the variation of surface tension with the liquid used; the effect of temperature on surface tension; measurement of surface tension of water and other liquids in grams per centimeter or ounces per inch; surface tension due to attractive forces between the molecules; surface tension dependent upon the nature of the surfaces in contact; surface energy measured by T × A where T is the value of the surface tension and A the area of the surface; surface energy a minimum; the rise and fall of liquids in capillary tubes, the spherical form assumed by small drops; dyeing, and filtration, shown to be illustrations of the tendency of surface energy to be reduced to a minimum; pressure within a soap bubble.

One examination paper.

Chemistry.

An experimental course defined as follows:—Chemistry of the Middle School reviewed and continued. Reversible reactions. Chemical equilibrium. Rate of reaction and conditions that affect it (including catalysis). A study of the following elements and their most characteristic compounds, having regard to Mendelejeff's classification and to their most important economic and industrial applications, hydrogen, sodium, potassium, magnesium, zinc, calcium, strontium, barium, aluminium, carbon, silicon, tin, lead, nitrogen, phosphorus, arsenic, antimony, bismuth, oxygen, sulphur, fluorine, chlorine, bromine, iodine, iron, copper.

One examination paper.

Biology.

Zoology.—Practical study of the external form of all types, and the dissection or the study of prepared specimens (or models), as specified below. Observational drawings are essential. An elementary knowledge of the chief functions of the body—nutrition, irritability, motility, excretion, reproduction—and of the mode of life and the life history of the various types. Study of the principles of classification in any one group, and recognition of the commonest forms in all.

The Frog.—Practical study of the external features; skeleton; visceral dissection; central nervous system; action of a typical muscle.

Practical study of a cross-section for arrangement of organ systems. Observation of external features of development.

THE FISH.—Practical study of the external form; chief visceral organs; circulation and respiration; comparison with frog as to organs of locomotion, circulation, and respiration.

THE REPTILE.—Practical study of the external form of a snake and a turtle. Comparison with a lizard.

THE BIRD.—Practical study of the external form, plumage, and skeleton of some common bird. Adaptations to flight. Modification of bill and foot, in so far as they are of value in distinguishing the different chief types.

THE MAMMAL.—Practical study of the chief features of the skeleton, the visceral organs, and the chief divisions of the brain of a rabbit or a cat. Major characteristics of mammalian dentition and foot structure, as illustrated by the pig, horse, sheep, rabbit, dog, mole, and bat.

THE WORM.—Practical study of the external features, and dissection of the earth-worm. Study of cross-section for arrangement of chief organ systems only.

THE ARTHROPOD.—Practical study of the external form of the crayfish, including segmentation and appendages. Comparison of the external form of the crayfish, grasshopper (or cricket), millipede, and spider.

THE MOLLUSC.—Practical study of the external form, and mode of locomotion and respiration, of the fresh-water clam; comparison in these respects with the snail.

THE PROTOZOAN.—A practical study of the living amœba or paramœcium.

NOTE.—Dissection of at least the Frog and the Earth-worm by the pupil will be required. In other cases, prepared specimens or models may be used. Cross-sections will be studied with the low power microscope.

BOTANY.—General types of the great natural groups of plants; classification.

MORPHOLOGY.—Morphology of seed, root, stem, leaf, flower, and fruit. A study of the cellular structure of the leaf and of the relative arrangement of the more important tissues and tissue-systems of the stem and root (as shown by sections) of bean and maize, or of any other typical dicotyledon and monocotyledon.

PHYSIOLOGY.—Practical studies of absorption (osmosis), plasmolysis, transpiration, photosynthesis, respiration, irritability (e.g., heliotropism), growth and movement. An elementary knowledge of the phenomena of fertilization and reproduction.

ECOLOGY.—Modifications of organs for special functions. Seed dispersal. Light relations. Pollination and adaptations for cross-pollination. Plant associations, e.g., mesophytes, hydrophytes, xerophytes.

CRYPTOGAMS.—The practical study of representatives of the chief subdivisions of the cryptogams; spirogyra, chara, a mushroom, a lichen, a liverwort, a moss, a horsetail, a clubmoss, and a fern. Distribution and economic importance of yeasts and bacteria. Microscopic structure of the yeast cell; reproduction by budding. Microscopic observation of a bacterial colony.

PHANEROGAMS.—The practical study of representatives of the seed plants of the locality, including at least one member of each of the following orders: Coniferae, Carophyllaceae, Ranunculaceae, Cruciferae, Rosaceae, Leguminosae, Sapindaceae, Umbelliferae, Ericaceae, Labiatae, Scrophulariaceae, Borraginaceae, Compositae, Gramineae (so far as the structure of the flower and stem is concerned), Liliaceae.

NOTE.—As form becomes intelligible only in the light of a knowledge of function and adaptation, it is advisable that the physiological and ecological studies should be taken up in appropriate connection with the morphological. It is also to be emphasized that the making of faithful and neat records of observations is a most important adjunct. In many cases these should be expressed as drawings, but it should be borne in mind that drawing loses much of its value as an educative factor unless there be an insistence on absolute accuracy and the careful naming of all the features represented. Judgment should, therefore, be exercised in requiring no more than can be done well.